

MAGNETIC FIELD PROTECTION FOR THE PROJECTILE
OF AN ELECTROMAGNETIC COIL GUN SYSTEM

ABSTRACT OF THE DISCLOSURE

5 An electromagnetic coil gun system includes a launcher having a barrel
with a longitudinal bore therethrough, and a plurality of longitudinally extending
electrical excitation coils arranged circumferentially around the bore of the barrel
so that a magnetic field produced by an electrical current in each electrical
excitation coil penetrates into the bore. Each electrical excitation coil is
independently activated by the electrical current passed therethrough. There is a
10 projectile sized to be received within the bore of the barrel and having a
circumferential armature at a tail end thereof, and a nose end. The projectile
placed into the bore is fired by producing a traveling sequence of propulsive
currents in the electrical excitation coils moving in a direction from the breech end
toward the muzzle end of the barrel, so that a traveling propulsive magnetic field
15 produced by the electrical excitation coils interacts with the armature of the
projectile to propel the projectile in the direction from the breech end toward the
muzzle end of the barrel. Simultaneously, a traveling sequence of field-nulling
currents in the electrical excitation coils moves in the direction from the breech
end toward the muzzle end of the barrel but closer to the muzzle end of the barrel
20 than the traveling sequence of propulsive currents and spatially leading the
traveling sequence of propulsive currents. The field-nulling currents are in a
circumferential direction opposite to the propulsive currents, thereby at least
partially nulling the traveling propulsive magnetic field at the nose end of the
projectile.